

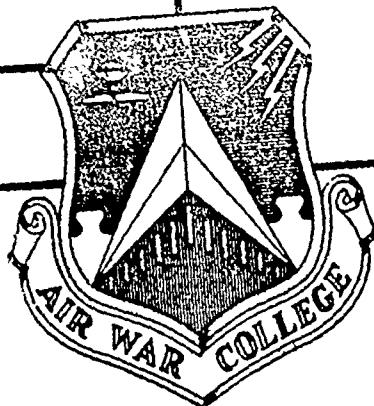
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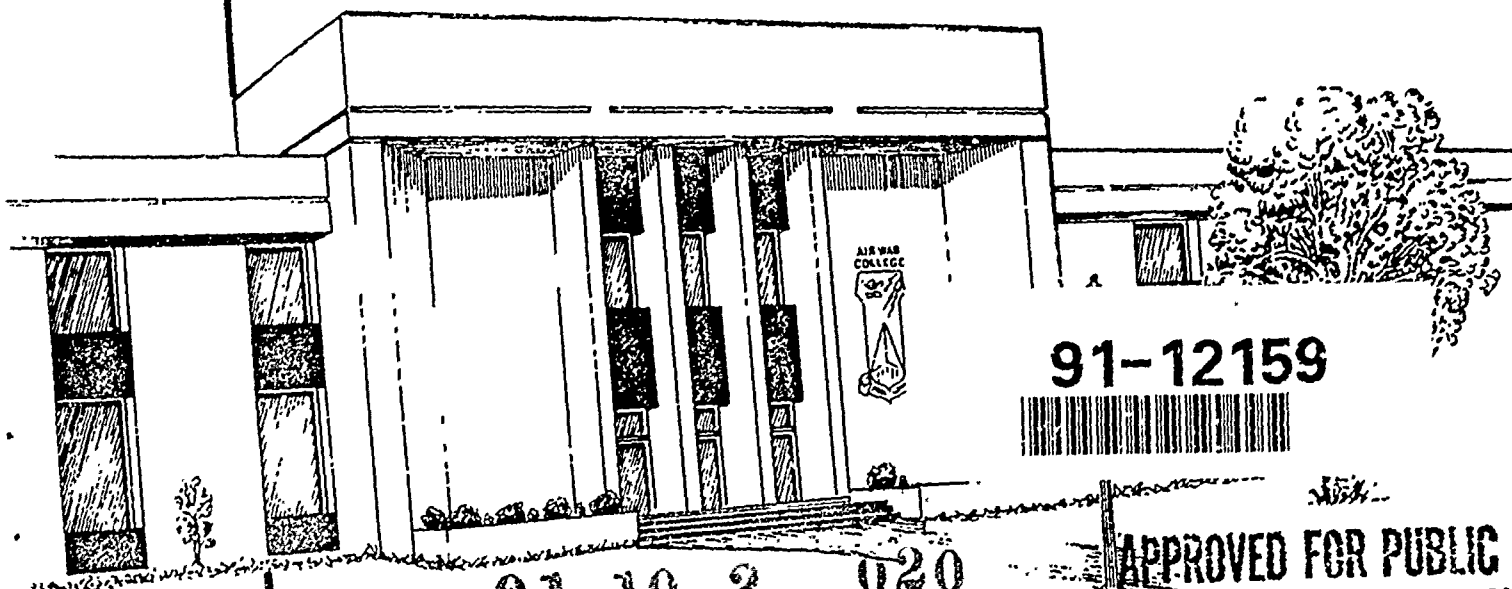


THE CHINESE AIR FORCE--ROADBLOCKS TO MODERNIZATION

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THE CHINESE AIR FORCE: ROADBLOCKS TO MODERNIZATION

by
Jim Wilson

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A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY
IN
FULFILLMENT OF THE CURRICULUM REQUIREMENT

Advisor: LTC James M. Jackson, III

MAXWELL AIR FORCE BASE, ALABAMA
May 1990

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EXECUTIVE SUMMARY

TITLE: The Chinese Air Force: Roadblocks to Modernization.

AUTHOR: Jim Wilson

U.S. and other Western efforts to help China modernize its Air Force may be misguided because they focus on the sale of high-tech weapons and components. Beijing's greatest difficulty in modernizing its Air Force probably is not acquiring advanced weapons, rather it is choosing weapons that China's military can use effectively, maintain, and sustain in combat and that China's industry can produce. Beijing has failed to develop an overall force development model that integrates military needs with industrial capabilities.

BIOGRAPHICAL SKETCH

Jim Wilson (Ph.D., School of Oriental and African Studies, University of London) is a China analyst at the Central Intelligence Agency. Prior to joining the CIA in 1983, he spent three years as an analyst of Chinese military capabilities at the Defense Intelligence Agency. Mr. Wilson is a graduate of the Air War College, class of 1990.

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New Strategies: The Need for a Modern Air Force

Beijing's greatest difficulty in modernizing its Air Force probably is not acquiring advanced weapons, rather it is choosing the right weapons--those that China's military can use effectively, maintain, and sustain in combat, and that China's industry can produce. U.S. and other Western efforts to help the Chinese modernize their Air Force tend to focus on specific weapons systems and components rather than on doctrinal and structural changes the Chinese could adopt to use modern weapons more effectively. Western corporations are interested in selling completed systems and components, not in teaching the Chinese how to make them. For their part, the Chinese are reluctant to admit to weakness that make it difficult for them to absorb and use advanced technologies, and they resent Western efforts to learn more about the internal workings of China's military and industrial capabilities, which they see as meddling in China's internal affairs or even spying.

The Chinese have had difficulty coordinating three aspects of military modernization:

- o Acquisition of modern technology and advanced weapons.
- o Modernization of their defense industries to produce advanced weapons.

- o Preparation of the People's Liberation Army (PLA) to use advanced weapons.

A considerable part of their problem results from Beijing's tendency to treat these aspects of military modernization as separate problems instead of as a single problem that requires a coordinated approach.

Mao Zedong's strategy of luring an attacker deep into China relied on guerilla warfare, on simple, easily maintained weapons, and on unsophisticated logistics. Today, the Chinese have difficulty working out operational and management techniques to fit modern weapons, because of an ingrained propensity to keep military doctrine and logistics as simple as possible.¹ Many Western analysts believe that, even if Beijing could afford to equip its huge Air Force with sophisticated military weapons, they would quickly become useless, because the PLA could not maintain or supply them.²

Forward Defense of the Industrial Northeast

China's new strategy of a forward defense of the industrial northeast envisions meeting a Soviet attack at prepared defensive positions along a line that is generally 100 to 200 kilometers from the border but still forward of key

¹See, for example, William T. Tow. "Strategy, Technology, and Military Development: Sino-American Strategic Relations." in June T. Dreyer, ed. *Chinese Defense and Foreign Policy*. New York: Paragon House, 1989 (hereinafter cited as Tow), p. 277.

²Tai Ning Cheung. "Training The New Professionals." *Pacific Defense Reporter* 13:41-42, Apr 87 (hereinafter cited as Tai), p. 42.

cities and industrial areas. The new defensive line follows the edge of the Gobi Desert north of Beijing and the mountain ranges around the central Manchurian basin. Beijing hopes that relatively immobile local forces at key defensive positions could delay Soviet advances until the main thrust of attack was identified and China's main force maneuver units could be committed to battle.³

A more effective Air Force is vital to an active defense of China's industrial heartland in the northeast. The PLA Air Force mission in defense of northeast China would be complex and at a minimum would include the following:

- o Conduct reconnaissance to determine the main thrust of a Soviet attack and distinguish between major threats and feints or diversions.
- o Slow a Soviet advance as much as possible to give ground force maneuver units time to deploy to forward positions.
- o Provide ground attack support for main force units to help blunt Soviet advantages in armor, artillery, and mobility, and, if possible, provide air transport support.⁴

³Lonnie D. Henley. "China's Military Modernization: A Ten Year Assessment." in Larry N. Wortzel, ed. *China's Military Modernization: International Implications*. New York: Greenwood Press, 1988 (hereinafter cited as Henley: "China's Military Modernization"), p. 103.

⁴This more forward strategy will require a considerable investment in facilities, transportation, and logistics; the road and rail network in the area is sparse, and there are few fighter airfields and no bases capable of supporting medium or heavy bombers along China's northeast border with the Soviet Union. The lack of forward airbases and the short combat radius of Chinese fighter and ground-attack aircraft will

An essential precondition for the Air Force in the defense of the northeast is preventing the Soviets from gaining total air superiority. Given the capabilities of modern Soviet bomber, attack, and reconnaissance aircraft, the U.S.S.R. could make Chinese ground operations nearly impossible, if the Soviets had unrestricted use of the air over Sino-Soviet battlefields and Chinese rear areas. While it is conceivable that the Chinese could execute the new strategy without themselves dominating the air war, they almost certainly could not do so in the face of uncontested Soviet air superiority.

Frontier Wars

Although Beijing continues to perceive Moscow as the most serious long-term threat to its security, improving Sino-Soviet relations, particularly since Secretary Gorbachev's visit to Beijing in May 1989, have shifted Beijing's attention from the threat of an all out war with the U.S.S.R. to the probability of recurring conflicts with other neighbors. In the near term, Chinese Air Force planners probably will have an easier time justifying acquisitions of technology that do not focus solely on the Soviet threat but apply to a conflict with smaller though better equipped Indian or Vietnamese air forces on the Tibetan or Sino-Vietnamese borders, or to

greatly hamper forward operations. In addition, according to a U.S. government official, the Chinese Air Force has little or no capability for close air support of ground troops and, despite much talk of combined arms warfare, does not have permanent liaison personnel (such as forward air controllers) stationed with ground force units. Author's correspondence.

amphibious operations in the contested waters of the South China Sea.

We have a relatively clear understanding of the evolution of China's new military strategy and of the equipment China seeks.⁵ In the past few years, Chinese analysts, military officers, and engineers have discussed equipping the Chinese Air Force for several different potential missions:

- o To contest enemy air superiority, Beijing wants to acquire improved all-weather interceptors with modern avionics, radars, engines, and beyond-visual-range air-to-air missiles; modern ground based radars; surface-to-air missiles, and airborne warning and control systems (AWACS).
- o To increase airborne reconnaissance capabilities, Beijing wants to acquire long-range side-looking cameras and radars.
- o To extend the range of Chinese air operations, Beijing wants to acquire air-to-air refueling technology and equipment.⁶

⁵For a discussion of changing Chinese military doctrine and the new strategy of "people's war under modern conditions," see Ellis Joffe. *The Chinese Army After Mao*. Cambridge, MA: Harvard University Press, 1987.

⁶China has approached the British Inflight Refueling Corporation for modification of the Chinese B-6 (Tu-16) bomber as a refueling tanker. A model displayed at an international arms fair shows a twin probe and drogue system on the B-6 with two Chinese A-5 ground attack aircraft refueling. Bob Furlong. "Dragon Takes Off Slowly--An Assessment of the Chinese Air Force." *International Defense Review* 20:1165-1168, Sep 87 (hereinafter cited as Furlong), p. 1166.

- o To support Chinese ground forces, Beijing wants to acquire modern ground attack aircraft with all-weather, low-level capabilities and modern support and attack helicopters.
- o To increase airlift capability, Beijing seeks heavy air transport aircraft and improvements to smaller Chinese transport aircraft.

Although we know a great deal about the equipment the Chinese want, we know comparatively little about Chinese planning for operational or logistics improvements. The Chinese freely discuss the types of weapons systems and technology they want to acquire, but they are reluctant to discuss operational plans and concepts. This reluctance undoubtedly stems, in part, from a Chinese penchant for secrecy and a desire to conceal PLA vulnerabilities from foreign intelligence organizations, but it also may reflect a failure on China's part to work out the operational doctrines and procedures necessary for the effective use of modern weapons.

One analyst recently expressed his view that the Chinese have concentrated almost exclusively on sophisticated weapons and technology, but have neglected the doctrinal basis for the use of those weapons, have paid little attention to improving training and logistics, and have failed to conduct extensive

cost-benefit analyses of competing technologies.⁷ Another analyst said that although the Chinese are greatly interested in the U.S. air-land battle doctrine and have discussed the topic with U.S. military analysts in the United States and China, it was only in 1986 that the Air Force College in Beijing conducted its first joint service course in combined arms operations for middle-level ground and Air Force officers.⁸ If Beijing were planning a traditional people's war this would not be so important. It is because the Chinese are now planning a different kind of war that Beijing feels the need to modernize its Air Force. As one Western analyst put it, "For a war with the U.S.S.R., air power will play a critical role in the strategy being developed and tested by the Chinese armed forces."⁹

Priorities and Scarce Resources

Most Chinese leaders, including military commanders, agree that military modernization must follow the modernization of agriculture, industry, and science and technology, but military leaders fear that a short-term lack of focus on specific military needs could leave the PLA Air Force far behind and unable to take advantage of improvements

⁷Tov, p. 272.

⁸Henley: "China's Military Modernization", p. 104-105.

⁹Paul H.B. Godwin. "People's War Revised: Military Doctrine, Strategy, and Operations." in Charles D. Lovejoy, Jr. and Bruce K. Watson, eds. *China's Military Reforms: International and Domestic Implications*. Boulder: Westview Press, 1986, p. 9.

in the economy. In addition, the Chinese tend to spend their scarce resources on high-tech equipment--chosen by narrow measures of performance--rather than on overall capability, reliability, and ease of support.

The Chinese do not have enough money to equip a modern Air Force through outright purchases. Total defense spending has fallen slightly in absolute terms from a published high of 22.3 billion yuan in 1979, but China's economy has grown rapidly over the same period and, calculated as a percent of the national budget, defense spending in recent years (nine percent) is about half what it was 10 years ago.¹⁰ One senior PLA officer said in 1985 that the total defense budget was equivalent to 4,000 yuan (about \$1,300) per soldier per year, that defense spending could not be increased in the next several years, and that the only way more money could be spent on military modernization was through drastic troop reductions.¹¹ Although, the PLA was subsequently cut by about 25 percent to some 3.25 million men, according to published reports, it seems unlikely that spending on weapons development has kept up with inflation.

¹⁰Chong K. Yoon. "Problems of Modernizing the PLA: Domestic Constraints." in Larry M. Wortzel, ed. *China's Military Modernization: International Implications*. New York: Greenwood Press, 1988 (hereinafter cited as Yoon), p.18. Actual Chinese defense spending is difficult to determine and may be twice published figures, but general defense spending trends are probably accurately reflected in the published figures.

¹¹Joseph P. Gallagher. "China's Military Industrial Complex: Its Approach to the Acquisition of Modern Military Technology." *Asian Survey* 27:991-1002, Sep 87 (hereinafter cited as Gallagher), p. 999.

Other factors complicate Chinese efforts to increase spending on modernization of defense industries. The Chinese are very reluctant to become dependent on foreign suppliers and so tend to concentrate on specific items of equipment that they hope to reverse engineer rather than on integrated defense systems. When Soviet advisors withdrew in the early 1960s, they left factories unfinished, and vital parts orders unfilled.¹² If China were dependent on foreign suppliers for spare parts and replacement equipment, those suppliers would possess a *de facto* veto on Chinese use of modern military equipment in the future.

To increase investment in the defense industries, particularly in research and development, Beijing has encouraged factories to use excess capacity to produce civilian goods and has allowed the factories to keep a percentage of the profits. Industries have also been granted proprietary rights to technologies, processes, and designs that result from their own investment and are allowed to sell them and raise additional funds.¹³ The PLA must come up with one-third of its total budget through its own enterprises. According to an article in the journal *Liberation Army Daily*, some 100 Air Force enterprises are managed through a division of the Air Force Logistics Department and earn over 500,000

¹²Si Yeng Bai. "Understanding the Chinese Defense Industry." *Military Technology* 11:36-38, Mar 87 (hereinafter cited as Bai), p. 36.

¹³Robert Karniol. "China's Bid to Improve R&D Management." *Jane's Defense Weekly* 8:597, 19 Sep 87, p. 597.

yuan (about \$162,500) annually. Total Air Force earnings reportedly exceeded 200 million yuan in 1988.¹⁴ This effort has had mixed results, however, and some Western analysts believe that the few profitable ventures are not based on excess capacity but have been accomplished by shifting resources from defense to civilian production.¹⁵

The defense industries have also had difficulty raising hard currency from arms sales because they are in direct competition for the same limited market with the PLA itself. Manpower reductions have left the PLA with huge stocks of low-tech equipment that it cannot use. Instead, the General Staff Department (GSD) of the PLA wants high-tech equipment that China's defense industry cannot build. Representatives from Chinese industry, who are trying to land foreign arms contracts, consistently are unable to meet delivery schedules and prices offered to the same customers by the GSD's import-export arm, the Polytechnologies Corporation. It is difficult to calculate sales lost by the Ministry of Aerospace Industry because of this internal competition, but in 1986, China's North Industries Corporation (NORINCO), which represents non-aerospace industries, reportedly suffered a 60 percent decline in the value of its defense products.¹⁶

¹⁴Jiefangjun Bao. 1 September 1989.

¹⁵Richard J. Lathan. "Implications of the Post-Mao Reforms on the Chinese Defense Industries." in Charles D. Lovejoy, Jr and Bruce K. Watson, eds. *China's Military Reforms: International and Domestic Implications*. Boulder: Westview Press, 1986, p. 45.

¹⁶Bai, p. 41.

Structural Problems: Confused Lines of Authority and Responsibility

The structure of China's military industrial complex handicaps Beijing's efforts to absorb modern military technology.¹⁷ Central military authority rests in four or five senior members of the Military Commission of the Chinese Communist Party, which runs the PLA through three coequal departments: the General Staff Department, the General Political Department (GPD), and the General Logistics Department (GLD). China's State Council runs the defense industries through the several Ministries of Defense Industry. Aircraft, missiles, and space-launch vehicles, for example, are produced by factories under the direction of the Ministry of Aerospace Industry.¹⁸

In practice the PLA has little control over the weapons acquisition process. In theory, the Air Force and other PLA branches submit weapons requirements to industry through the General Equipment Bureau of the General Staff Department. The General Equipment Bureau receives finished production and turns it over to the General Logistics Department for

¹⁷We have difficulty understanding lines of authority and responsibility in China because 1) we lack up-to-date, reliable information, 2) the officially published structure is a confusing welter of duplicate titles and overlapping authority, 3) authority often rests on a network of individual connections rather than official titles, and 4) the Chinese are in the process of streamlining and reorganizing the PLA and defense industries.

¹⁸The former Ministry of Aviation Industry and Ministry of Astronautics Industry were combined to form the Ministry of Aerospace Industry in mid-1988 but are still operated as separate entities except at the highest level.

distribution and maintenance throughout the PLA. The General Staff Department theoretically is then responsible for technical and combat training on the newly acquired equipment. Coordination of industry, research and development, and the military is the responsibility of the Commission for Science, Technology, and Industry for National Defense (COSTIND) under the direct control of the State Council and the Central Military Commission.¹⁹ Foreign suppliers can be approached through Polytechnologies, the Foreign Affairs Bureau of COSTIND, or one of the several import export arms of the Ministries of Industry.

The Air Force does not control what aircraft, weapons, and weapons-related technology, China will buy. There is no formal system, no force development process, to insure that China acquires technology and weapons that the Air Force can maintain and use effectively. COSTIND, although a uniformed branch of the military, is staffed largely by managers, engineers, and technicians from the defense industries. The defense industries order weapons and seek technology based on narrow measures of performance and take little account of the education of the airmen who will use the weapon, the type of organization that will field the weapon, or the organization's capability to maintain and support the weapon. According to a U.S. official who dealt extensively with representatives of

¹⁹Paul H.B. Godwin. *The Chinese Communist Armed Forces*. Maxwell Air Force Base, AL: U.S. Government Printing Office, 1988 (hereinafter cited as Godwin: *Chinese Armed Forces*), pp. 39-43.

the Chinese Air Force, the Air Force and the Ministry of Aerospace Industry also have difficulty agreeing on foreign purchases because each wants to pay in Chinese currency and have the other put up the necessary hard currency.²⁰

The same U.S. official had several discussions with Chinese Ministry of Aerospace and Air Force personnel about a failed attempt to build a new fighter called the F-12. The Air Force submitted a very general requirement that led to several inconclusive design meetings. The ministry produced a total of six prototype aircraft over a several year period in the mid-1970s, only to have the Air Force reject each as unsuitable. None was ever produced. Ministry personnel later complained that the Air Force never really knew what it wanted.²¹

From 1984 to 1986, assistant U.S. Army Attache Major Joseph Gallagher attended more than 30 presentations in Beijing by Western defense firms and said that, in all the meetings, less than five percent of the Chinese present were from the GSD or the services. He said that 95 percent of the Chinese present were from the COSTIND or the defense industries. The Chinese at these meetings showed little interest in supporting or maintaining new weapons, according to Gallagher:

²⁰Author's correspondence.

²¹Ibid.

When reminded that discussion of supportability and training were essential to successful transfer of a military technology, the Chinese either ignored the remarks or answered that such aspects would be considered only after production was successfully started.²²

Gallagher also cites a contract between the Chinese defense industries and a British arms manufacturer as an example of lack of appreciation of PLA service needs. In 1986, the Ministry of Ordnance Industry signed an agreement with Westinghouse to produce armored vehicles for export, even though the PLA gave no indication that it wanted to purchase the vehicles.²³ Similarly, many foreign projects of the Ministry of Aerospace Industry, such as the F-7M fighter, are geared towards foreign sales and probably are not the result of Air Force requirements.

For its part, the PLA apparently has little confidence in the ability of Chinese industry to produce the types of modern weapons it wants and needs. As Gallagher and other Western observers point out, the PLA shows little consideration for the needs and capabilities of Chinese industry when it buys foreign weapons systems. In 1984 the GSD purchase of 24 Blackhawk helicopters from Sikorsky did little to help China produce modern helicopters.²⁴ Similar purchases of Western

²²Gallagher, p. 1001. The U.S. official cited in the previous footnote said that, in his experience, the Chinese were aware of the problems they faced in coordinating military and industrial needs. Representatives of the Chinese Air Force asked how the U.S. military influenced industrial production, and representatives of Chinese industry wanted to know how U.S. industry determined the needs of the military.

²³*Ibid.*, p.997.

²⁴*Ibid.*

avionics, missiles, radars, head up displays, etc. do little to increase the level of technology in the defense industries, because they are not maintained and supported by Chinese industry.

The Military Industrial Base

Military and industrial relations are complicated by secrecy and strict compartmentalization that prevent extensive sharing of experience or cross fertilization of ideas. Security in the Chinese ministries of industry and their research directorates is high, even in areas that would be unclassified in the West, and administrative control is strictly vertical. Horizontal interaction among Chinese scientists and engineers tends to be circumscribed and informal.²⁵

Vertical organization of industry tends to foster a narrow approach to problem solving and stifles systems engineering necessary to develop new aircraft design. Each of China's major aircraft plants is a separate entity that produces an aircraft and almost all of its components except for the engines, tires, avionics, and windscreen. Chinese engineers tend to stay at the same plant, specializing in the same area throughout their careers. These engineers may be highly skilled but have little or no opportunity to see how

²⁵David Shanbaugh. "China's National Security Research Bureaucracy." *China Quarterly* No.110:276-304, Jun 87, p. 280.

their product contributes to the overall performance of a particular aircraft, how other engineers solved similar problems for other aircraft, or how they could adapt an existing technology to a new aircraft design.²⁶

The Chinese aircraft industry has enormous manpower resources, but its technological deficits will hamper the absorption of sophisticated technology for many years to come. The current level of technology in Chinese industry is not solely a result of backwardness, it is also a reflection of the past requirements of the PLA--its main customer. It will take Chinese industry some time to adapt from people's war doctrines that required simple, rugged, reliable equipment produced in the largest possible quantity in the shortest possible time. One outside observer, writing in 1987, said that Chinese engineers and managers had been focusing on simple, cheap, reliable equipment for so long that they probably could not adjust to the long and painstaking research and development and planning effort required for modern weaponry. He also felt they had difficulty appreciating the special procedures needed to maintain advanced weapons systems.²⁷

In addition, a shortage of competent managers and a history of central planning directives that also emphasized quantity production at all costs have left China with a

²⁶ Author's correspondence with US government official.

²⁷ Bai, p. 47.

serious quality control problem, particularly in high-technology areas, such as aviation. According to one Western analyst, surveys conducted in the mid-1980s by the Chinese ministries of industry have noted declines in quality, presumably exacerbated by industry's attempts to adopt high technology methods.²⁸

Chinese scientists and engineers are highly skilled and have had successes at reverse engineering and hand building items acquired openly or clandestinely from the West, but reverse engineering has its limitations. It is relatively easy for the Chinese to determine the design features of equipment they possess and, with testing, to learn a great deal about the materials used. It is much more difficult, however, to determine why something was done, to understand the compromises and tradeoffs involved.²⁹ Even with help, the Chinese have had difficulty copying sophisticated systems. In 1975 China purchased 50 Spey jet engines from the U.K. along with technical expertise, training, and equipment that was intended to eventually allow the Chinese to produce the engines in their plants. As of 1987, Chinese engineers had handcrafted as many as 12 Spey copies but according to Western observers, were little closer to serial production than they had been 12 years before. Even if they managed to produce the

²⁸Yoon, p. 15.

²⁹Wendy Frieman. "Foreign Technology and Chinese Modernization." in Charles D. Lovejoy, Jr and Bruce K. Watson, eds. *China's Military Reforms: International and Domestic Implications*. Boulder: Westview Press, 1986, p.57.

engines, they only would have achieved a technology that is now twenty years out of date.³⁰

As one Western aviation expert put it, Chinese engineers have a different mind set than their Western counterparts. Whereas Western engineers work to close tolerances and test over and over again, the Chinese, who cannot afford sophisticated test equipment, tend to follow a conservative design philosophy adopted from the Soviets in the 1950s. In 1987, a Chinese official who worked on a joint contract with McDonnell Douglas to produce MD-82 aircraft in Shanghai said the Federal Aviation Administration (FAA) requires a redundant, "fail safe" philosophy, but the Chinese have always relied on the brute strength of their designs.³¹ Aircraft engines the Chinese acquired from the Soviets, for example, achieved high thrust by increased air flow and fuel consumption. Newer engines the Chinese are now trying to copy rely on close tolerances, high operating temperatures, hard-to-work specialty materials, and exotic metals to achieve the same objective.³² In 1984, the McDonnell Douglas team setting up the MD-82 production line at a Ministry of Aviation factory in Shanghai decided that the only way they could get FAA

³⁰Yoon, p. 14

³¹Richard G. O'Lone. "China Reshaping Industry to Meet Extensive Needs." *Aviation Week and Space Technology* 16 Nov 87, pp. 16-21 (hereinafter cited as O'Lone: "Reshaping Industry"), p. 19.

³²John Frankenstein. "Chinese Weapons Development: Process, Progress, Program?" in Charles D. Lovejoy, Jr and Bruce K. Watson, eds. *China's Military Reforms: International and Domestic Implications*. Boulder: Westview Press, 1986.

certification was to build a mirror image of their Long Beach, California, facility and teach Chinese workers to follow procedures by rote. McDonnell Douglas sent 87 million pages of data (7,000 metric tons) and hired 300 translators and 80 interpreters to help set up the Shanghai plant.³³ By December 1989, the Shanghai plant had completed 12 of 25 aircraft originally contracted for, and the Chinese were negotiating for further orders.³⁴

The Chinese aircraft industry does have its strengths, however, not the least of which is a huge, highly-skilled manpower pool. In 1987, the Ministry of Aviation had more than 500,000 workers at 200 factories, most of whom were severely underemployed and seeking civilian contracts. At Xi'an a claimed normal production rate of 22 B-6 bombers per year had fallen to three. The Chengdu plant with 18,000 workers was turning out a few F-7Ms (updated copies of the Soviet MiG-21) for export but, according to the Chinese, was capable of producing hundreds of fighters per year.³⁵ A skilled Chinese machinist with experience in exotic metals earns approximately \$600 per year, and Chinese engineers and scientists, according to a Western aviation expert, have an impressive, if theoretical, knowledge of castings, turbine

³³O'Lone: "Reshaping Industry," p.19.

³⁴Aviation Week and Space Technology, 11 Dec 89, pp. 61-62.

³⁵O'Lone: "Reshaping Industry," p.18. Each plant is, in many respects, a self-contained community that provides workers and their families with housing, schools, markets, and cultural activities. It is not unusual to have three generations of workers in the same family on an assembly line.

blade design, aircraft electronics, and computer integrated manufacturing.³⁶

In addition to the MD-82 project, the Chinese produce other modern aircraft components, including: US-designed avionics for their Y-7 transport (a version of the Soviet AN-24 twin-engined turboprop) and parts for the Boeing 737 and Canadair CL-215.³⁷ At their Harbin Aircraft Plant the Chinese manufacture several composite material components for their copy of the Aerospatiale SA365N1 helicopter (called the Zhi-8), although China has been unable to gain approval of the Multilateral Coordinating Committee on Export Controls (COCOM) to import the manufacturing technologies to make aramid fiber and other advanced raw materials.³⁸ The Chinese also have some sophisticated equipment such as a French (Dassault) Catia three-dimensional CAD/CAM system in operation at two Ministry of Aeronautics and Astronautics research centers.³⁹

³⁶Leonard Bertain. "Don't Discount China's Potential To Succeed as Industrial Power." *Aviation Week and Space Technology* 127:61-62, 7 Dec 87, p. 62. Visitors to these plants, however, note that the advanced Western equipment is underused and speculate that, having paid so much for the machines, the Chinese could not afford training in their use.

³⁷Larry M. Vortzel. "U.S. Technology Transfer Policies and the Modernization of China's Armed Forces." in Larry M. Vortzel, ed. *China's Military Modernization: International Implications*. New York: Greenwood Press, 1988, p.178.

³⁸Richard G. O'Lone, "Chinese Developing Y-12 Export Version." *Aviation Week and Space Technology* 14 Dec 87, p. 101.

³⁹O'Lone: "Reshaping Industry," p.19.

Logistics and the Air Force

In the Sino-Indian war of 1962 and the 1979 incursion into Vietnam, air forces played little part as Chinese ground forces overran enemy positions, drove forward for a brief period, then fell back to defensive positions along the Chinese border. Beijing apparently never contemplated a sustained air offensive in either war and apparently did not have the air or motor transport to hold the forward lines it briefly seized.⁴⁰

Logistics deficiencies may have been a key factor limiting Chinese Air Force operations on the Vietnamese and Indian borders. According to a recent Chinese magazine article, the Air Force has its own fleet of boats to supply fuel and spare parts to airbases along the coast and inland waterways. Some forward airfields used during the 1979 incursion in Vietnam lacked rail spurs or good roads and could be supplied only by water.⁴¹ There is no rail transportation to Lhasa or other Tibetan airfields, and the Chinese would have had to truck in all fuel for air operations on the Sino-Indian border.

Logistics in China's Air Force has undoubtedly changed significantly since the 1979 Vietnam incursion as part of a

⁴⁰For a discussion of the Sino-Indian conflict of 1962, see Neville Maxwell, *India's China War*. New York: Pantheon Books, 1970. A good analysis of China's 1979 incursion into Vietnam is contained in Harlan W. Jencks, "China's Punitive War on Vietnam: A Military Assessment" *Asian Survey*, August 1979.

⁴¹*Zhonggou Kongjun* (China Air Force). 28 November 1988.

general streamlining and professionalization of the entire PLA, but we have little evidence on the nature and extent of improvements or on what still needs to be done. The PLA Air Force is the third largest in the world (after the Soviet and U.S. air forces) and consists of some 5,000 fixed-wing combat aircraft, 550 fixed-wing transport aircraft, and 350 helicopters, mostly derived from Soviet designs of the 1950s and 1960s.⁴² Air Force manpower levels are usually put at 490,000,⁴³ although this may now be closer to 375,000 as a result of cuts announced in recent years. In addition, the Chinese probably have retired many obsolete aircraft such as their F-5 (MiG 17) fighters and B-5 (Illushin 28) bombers.⁴⁴

Aircraft modernization and acquisition of sophisticated Western equipment on a small scale probably already has caused logistics problems which foreshadow the difficulties China would face in maintaining large numbers of advanced aircraft and weapons. In addition to the 24 Blackhawk helicopters China has already received, the Chinese have signed a \$502 million contract with the U.S. for 50 avionics packages and 5 spares to upgrade its Mach 2 F-8 II interceptor. The F-8 II upgrade includes an advanced, look down shoot down radar, head up display, inertial navigation system, and mission and

⁴²Godwin: *Chinese Armed Forces*. p. 52.

⁴³John Robert Young. *The Dragon's Teeth: Inside China's Armed Forces*. New York: Orion Books, 1987 (hereinafter cited as Young), no page.

⁴⁴Henley: "China's Military Modernization," p. 110.

data computers. The Chinese are negotiating with several European suppliers for a beyond visual range missile for the F-8 II. Beijing has also imported British avionics and Western communications systems for its F-7M fighter, and has signed contracts with Aeritalia for new avionics for its A-5M ground attack fighter.⁴⁵ In addition, the Chinese have purchased Aerospatiale SA342 Gazelle Helicopters and reportedly would like to arm them with HOT antitank missiles.⁴⁶

Before the Chinese can maintain large numbers of advanced aircraft and weapons, they will need to improve the education of their military personnel. In a growing economy, the PLA has had a difficult time competing for college graduates. Jobs in industry and government are attractive to college graduates where they are better paid and more respected than other urban workers. In addition, college graduates are increasingly sharing in a growing market economy in both urban and rural areas. Recent figures are unavailable, but in 1981 the PLA recruited only 10,000 college graduates, down 5,000 from the year before.⁴⁷

⁴⁵Furlong, p. 1666-67.

⁴⁶Shown on television coverage of the Tiananmen protests. Most Western governments have held up deliveries under these contracts to show their displeasure with Beijing's recent military crackdown on political protesters. China's continued access to sophisticated Western military technology is in doubt, at least in the near term.

⁴⁷Lonnie D. Henley. "Officer Education in the Chinese People's Liberation Army." *Asian Defense Journal* No.12:44; Dec 87 (hereinafter cited as Henley: "Officer Education"), p. 59.

Although they have recently been improved and expanded, it seems unlikely that the Chinese service schools and academies can produce the estimated 30,000 officers per year it will need for its reduced force of 3.2 million men. According to one Western analyst, the Chinese military academies can produce no more than 15,000 to 20,000 graduates per year.⁴⁸

Pilot training in the Chinese Air Force is also weak, particularly on advanced aircraft. PLA Air Force schools turn out 1,000 pilots per year. They come directly from high schools, spend two years in pre-flight school, one year in prop trainers (150 hours), and one year in jet trainers (130-150 hours). On assignment to a permanent post they receive another one year conversion training (120-150 hours) on the combat aircraft they will fly.⁴⁹ Finished pilots apparently do not get enough flight time to stay proficient and have very little opportunity to practice new tactics demanded by advanced aircraft. One Western observer, invited to what was probably a show-case unit in 1987, was told by the F-6 fighter pilots there that they averaged less than 10 flying hours per month. One squadron leader and instructor pilot said it had

⁴⁸The Chinese have said they want all PLA officers to be academy graduates. The projected need of 30,000 per year is based on average commissions per year in the US and Soviet military, adjusted for total manpower figures. *Ibid.*, p.64.

⁴⁹Richard G. O'Lone. "Chinese Air Force Developing Few New Aircraft Designs." *Aviation Week and Space Technology* 127:55+ 7 Dec 87 (hereinafter cited as O'Lone: "Chinese Air Force"), p. 59.

taken him 10 years to log 1,400 hours.⁵⁰ A U.S. official came up with similar figures after discussions with Chinese pilots. He estimated that bomber pilots probably averaged 80 flying hours per year, fighter pilots 100 to 120 hours per year, and A-5 ground attack pilots about 150 hours per year. He added that, although Chinese pilots used simulators, they tended to be instrument boards with rudimentary motion and visual displays, if any.⁵¹

We know much less about the training of logistics personnel, but it apparently also needs improvement. In addition to 14 flight training schools and nine anti-aircraft, communications, and weather schools run by the Air Force, two PLAAF schools mention maintenance or logistics in their published curricula. These are the Air Force First Maintenance School in Xinyang, Henan province, and the Air Force Engineering College, Xi'an, Shaanxi province.⁵² At the national level, of 37 military academies and schools not under one of the three services (Navy, Air Force, or ground forces), six have logistics-related curricula and four of these appear to be concerned with railway transportation.⁵³

⁵⁰Young, p. 161.

⁵¹Author's correspondence.

⁵²Henley: "Officer Education," p. 55.

⁵³*Ibid.*, p. 59.

Chinese Air Force logistics structure and operation are little known and as confusing to outside observers as those at the national level. The General Logistics Department has nominal control of all PLA logistics functions, but most Western analysts agree that Air Force logistics is the responsibility of PLAAF headquarters in Beijing, perhaps under the supervision of the GLD.⁵⁴ The Air Force Logistics Department reportedly is responsible for supplies and training (not further defined), whereas aircraft maintenance and repairs are the responsibility of the Air Force Engineering Department. China is divided into seven Air Districts or regions, coterminous with the PLA's seven military regions, and each designed to be as self-sufficient as possible in terms of logistics.⁵⁵

Each of the seven air district logistics departments reportedly operates parts and maintenance depots and distributes Air Force unique parts and equipment to airbases in each district. Airbases conduct only routine repair and maintenance, although, some airbases have machine shops capable of fabricating some aircraft parts. Chinese Air Force officers told a visiting U.S. Government official that in 1987 21 district depots had performed 10,000 engine overhauls and that the depots produced many parts. According to the U.S. official, the Chinese perform a complete engine overhaul at

⁵⁴Godwin: *Chinese Armed Forces*, p. 60.

⁵⁵O'Lone: "Chinese Air Force," p. 59.

about 300 hours, overhaul the engine a second time after another 250 to 300 hours, and scrap it after another 200 to 250 hours.⁵⁶ Other sources indicate that aircraft and components are also returned to the manufacturing plants for overhaul of airframe, engines, landing gear, and perhaps avionics. We do not know what percentage of aircraft are inoperable at any one time because of maintenance or parts requirements, but reports from the mid-1970s indicated rates as high as 50 percent.⁵⁷

Transportation has received considerable investment since its failures contributed to the loss of initiative in the Chinese incursion into Vietnam in 1979. The focus of Beijing's immediate concern is on civilian, not military, problems, however, and transportation is likely to be a key obstacle to Air Force modernization for several years. Like the Soviet Union, China is trying to build up its air transportation network, but as of 1987 its air cargo industry and the infrastructure needed to support it were virtually nonexistent. According to visiting Western aviation experts, Beijing had experienced a 30 percent per year growth in passenger demand, which had absorbed all investment.⁵⁸

⁵⁶ Author's correspondence.

⁵⁷ Godwin: *Chinese Armed Forces*, p. 111.

⁵⁸ O'Lone: "Reshaping Industry," p. 16.

China relies on an extensive rail and river network for most transportation needs. Even express trains are slow, however, and local roads are crowded, rough, and insufficiently dense in most rural areas to allow rapid distribution of material once it reaches a railhead. In part because its thin road network, Beijing has placed little emphasis on military truck production until recently. The Chinese are producing French, Czech, Romanian, and U.S. designs under license and are building their own copies of several Soviet military trucks. Most production, however, is going into the civil sector, so China will have to rely extensively on commandeered vehicles in wartime.⁵⁹

Outlook

The future of the U.S.-China military relationship is unclear in the wake of Beijing's brutal repression of political dissent and in light of much improved relations between the U.S.S.R. and China. If, however, the United States decides to continue helping China modernize its Air Force, a better understanding of the problems Beijing faces in absorbing advanced technology is essential. The United States will find it difficult to satisfy the conflicting demands of the PLA and the Ministry of Aerospace Industry and may end up angering both.

⁵⁹Harlan W. Jencks. "Defending China in 1987." *Current History*, Sep 87, p. 278.

China's growing experience in the design, manufacture, and operation of modern aircraft for commercial aviation could offer valuable experience for the modernization of the PLA Air Force. The experience may go for naught, however, if Beijing fails to adopt an overall force development model that integrates military needs with industrial capabilities. Without such a model and a regular exchange of information between the Air Force and the ministries of industry, China may be unable to exploit its skilled manpower reserves, recently acquired advanced weapons, or sophisticated manufacturing technology.

The few items of sophisticated weapons and equipment the Chinese acquired from the West have done little to help the PLA learn to sustain a modern Air Force. PLA Air Force training seems hopelessly inadequate, and its logistics system is still geared towards a much less complex force than Beijing wants to develop. Even with simple and inexpensive equipment, such as the Chinese F-6 fighter, that is uniform throughout an enormous force, the Chinese apparently are unable to maintain high levels of readiness.

If the Chinese are unable to maintain their recently acquired Western military equipment, the lack of a coordinated approach to weapons acquisition and force planning is likely to lead to mutual recriminations. The PLA probably will continue to criticize the defense industries for buying military technologies the PLA does not need. It also seems

likely that the defense industries will accuse the PLA of buying equipment without regard for the needs of Chinese industry. And both may blame Western suppliers for their failures. The defense industries and the PLA are not interested in outdated weapons and, thus, seek the latest technology. The Chinese see foreign interest in PLA operations and capabilities as interference and incipient espionage. When suppliers ask how their equipment will be supported in the field or suggest simpler technology, the Chinese assume the foreign manufacturers are withholding key technologies to assure future Chinese dependence.⁶⁰

⁶⁰In 1985, the Chinese Minister of Defense Zhang Aiping warned exporters not to withhold key "secrets" in their dealings with Beijing. Gallagher, p. 1000.

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